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ARTICLE

Ethnobotany and Indigenous Traditional Knowledge in Brazil: Contributions to Research in Ecopsychology

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ABSTRACT

This paper is the result of an investigation of the flora and traditional knowledge in the conception of *Javaé* indigenous people from the Txuiri village located on *Bananal* Island, Brazil. The objective is to investigate the plants used by these indigenous people, their diverse uses and to understand how traditional knowledge is passed on to new generations. This is a qualitative, descriptive and interdisciplinary survey, whose data collection strategies included the application of semi-structured questionnaires and collection of plants for cataloguing according to Angiosperm Phylogeny Group or APG III (2009). We identified 26 plant species, used for various purposes such as medicinal use, food, construction, craft and cultural, which were deposited in the Herbarium of the Federal University of Tocantins. Roots, stem and leaf are the plant parts most used by the community. The plants mentioned were most frequently found on the banks of the Javaés River and in the backyard of the residences. Significant traditional knowledge of these people about the plants are transmitted to new generations, through visual, orality and experimentation. Ethnobotanical studies strengthen research in ecopsychology while allowing research into the interactions between human populations and plants.

1. Introduction

The presence of plants in the most different types of environments has marked their ecological relevance for many living beings, especially for human history. In a vital area, the indispensable contribution to the maintenance of life through the supply of oxygen for many species to survive, in another utilitarian sense, its importance in culture, food and medicine [1]. The psychological sciences were not unaware of this debate, which intensified, at the beginning of this millennium, the approach to the concepts of connectivity with nature and environmental identity, very widespread in research dealing with this theme [2]. The understanding of this man-nature interaction allows us to outline the traditional knowledge that different cultural groups have about the environment and consecutively the plants surrounding them.

The variety of species that make up the group of plants constitutes the plant biodiversity, with numerous purposes that range from those used for the extraction of raw mate-

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rials for pharmaceuticals, to those that serve as essential oils, food, or teas, in addition to those used for ornamental purposes. It is worth mentioning that Brazil is considered one of the countries with the greatest biodiversity, with emphasis on the Amazon Forest [3].

In this context, which involves plant varieties and traditional knowledge, ethnobotany is included, which is characterized as an area of study that includes the relationships between people and plants [4, 5]. As well as ethnobotany, several fields of research associated with ethnobiology, ethnoecology, ethnoentomology, among others, have emerged. These areas, by using the prefix *ethno*, share the principle of reporting different subjects based on the shared vision of members of a particular culture [6].

Ethnobotany emerges as a science uniting research, analysis and popular knowledge that man has about plants. This context makes it possible to detect the profile of a particular traditional community, whit regard to uses in relation to vegetables and corroborates with the statement that the customs, beliefs and traditions of specific cultures, compose a set of information that reverberates the doings and knowledge botanical [7,8]. In this sense, ethnobotany is defined as the science that studies the knowledge and concepts developed by society about plants, encompassing both the way the social group classifies them and the purposes they give them [9].

The ethnobotany has an interdisciplinary character, linked to integration in which in practice it is demonstrated in the diversity of themes that permeate the disciplines and allow it to be studied, together with cultural aspects [10]. These ethnobotanical studies are important especially in Brazil, since its territory is home to one of the diversified flora in the world [11]. It is worth mentioning that studies in this area make interfaces with works of Psychology that contribute by subsidizing the understanding of human behavior regarding the sustainability of different living species on the planet, the valorization and exploitation of empirical knowledge of human societies, being possible to encourage the generation of scientific and technological knowledge directed to the sustainable use of natural resources [12].

This knowledge has passed from generation to generation through visual perception, being intimately interconnected with the need of peoples to apply it to their advantage, often to guarantee human survival, [13] since traditional peoples, especially indigenous people, have centuries-old skills in the handling, effects and uses of plants [14].

In this sense, studying plants, knowing and knowing their importance, is of fundamental importance so that forests are more preserved, less threatened, and the knowledge of traditional people more respected [15]. It is in this direction that ecopsychology endorses investigations in the realm of understanding beyond human relationships, extending to interactions with the natural resources that make up the environment, making it possible to benefit people's physical and emotional health and strengthen their belief systems [2, 16, 17].

In this perspective, with the intention of understanding the behavior of humans on the environment, several lines of investigation are outlined from the second half of the 20th century, such as Ecopsychology, Conservation Psychology and Environmental Psychology, among others, being this one the latter, consolidated since the 1950s and necessary for understanding people's conduct on the natural physical space [18, 19]. It is in this interface that this study is inserted, since indigenous peoples are holders of knowledge, especially those associated with flora and which, over time, transmit to generation through the observation of nature and orality, being solidified as a science.

According to data from the Brazilian Institute of Geography and Statistics –IBGE [20], the State of *Tocantins* has an estimated indigenous population of 14,118 and that according to the Special Indigenous Sanitary District – DSEI/TO [21], are distributed in 205 villages, represented by 12 ethnic groups: *Karajá, Javaé, Xambioá, Xerente, Krahô, Krahô Canela, Apinajé, Avá-Canoeiro, Kanela, Guarani, Funiô* and *Pankaru*, which form an important cultural and historical heritage. The *Javaé* are an indigenous people who speak a dialectal variation of the *Karajá* language, belonging to the *Macro-Jê* linguistic trunk, and are speakers of the *Iny* language. They currently have a population of 1,515 villagers who live in 19 villages on Bananal Island and try to maintain their culture despite constant contact with non-indigenous people and contemporary technological innovations.

The object of this work is the ethnobotanical study and the traditional knowledge of indigenous people from Bananal Island. The research question is: What are, how is the knowledge of the *Iny* people about plants used and transmitted? The research aims to characterize the useful plants used in *Javaé* systems and how the knowledge about them is passed on to the new generations. This ethnobotanical study gives us a line of evidence in ecopsychology on the transmission of intergenerational knowledge of indigenous people and their belief systems.

2. Methods

2.1 Characterization of the Study Area

The research followed the methods of qualitative in-

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terdisciplinary approach, with a descriptive character and was carried out from June to October 2019 with the *Javaé* indigenous people in the village Txuiri located on the Bananal Island, southwest of the state of Tocantins 52 km from the seat of the municipality of Formoso do Araguaia. The Bananal Island region comprises an area of about 20 thousand square kilometers and its latitudinal extension from the extreme north to the south, reaches an approximate distance of 330 km, dimensions that guarantee Bananal Island the position of the largest river island in the world, characterized by being a transition zone between the Cerrado and the Amazon biome, recognized for its biological diversity [22]. The village is located between the parallel 11°47'07 "S and the meridian 49°55'58 "W.

Figure 1. Aldeia Txuiri – Ilha do Bananal – Tocantins, Brasil.

Source: Google Earth / Authors collection.

The Txuiri village was established in the 1990s and currently 27 families live, totaling an estimated population of 107 people, who live in houses arranged towards the river bank. In the village it has a school, health post, leisure area with a soccer field and Aruanã house restricted to men. They are socially organized and have the chief as their political representative, as well as leaders such as the elders and ritual heads who corroborate with the community maintaining their culture through the reproduction of their customs, typical food, traditions, crafts, rituals with songs and body paintings [22, 23].

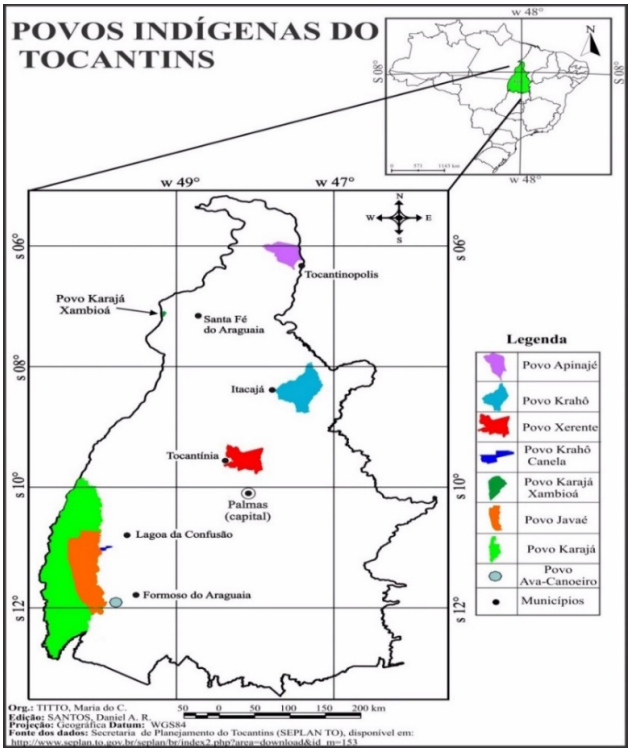

Figure 2. Location of the indigenous peoples of Tocantins, Brazil.

Source: TITO, Maria do C. (Org.) SANTOS, Daniel. A. R. (Edição)

The main economic activity is focused on agriculture where the indigenous people rent cattle pastures to farmers inside the island, the so-called 'retreats'; followed by family agriculture through small farms for subsistence where rice, cassava, corn and potatoes are planted. There are other sources of income and circulation of money from the sale of fish, handicrafts, retirement of the elderly and benefits from social programs [24].

2.2 Data Collection and Analysis

This work is a research carried out from June to October 2019, which followed the methods of qualitative and quantitative approaches, with a descriptive character, of an interdisciplinary nature. The data collection strategies comprised four procedures: construction and presentation of the research project in the village and Txuiri; submission of the research project to the Ethics Committee and data collection from daily living in the villages, application of questionnaires and collection of plants cited as useful by the indigenous people. The research was approved by the Committee of Ethics in Research of the Federal University of Tocantins Process Nº. CAAEE: 29322320.8.0000.5519 and National Council of Ethics in

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Research under CAAE No. 29322320.8.0000.5519.

For the presentation of the research with the *Javaé* indigenous community, visits were made to the homes of several residents of the villages and, mainly, there was a wide explanation about the research project and its objectives, during meetings promoted by the local leaders of the villages (Caciques and elder). After being accepted by the Txuiri village, the research project was submitted to the Ethics Committee for approval.

The main collection of data took place through visits to the village. With the collaboration and authorization of the indigenous people, it was possible to carefully monitor the daily lives of the *Javaé* people, always seeking to learn through observation and inquiry. In these opportunities, we sought to analyze the conceptions and ethno-knowledge of the *Javaé* indigenous people, their life history and their involvement with the environment, especially those related to cultural activities: parties, rituals, hunting, fishing, bathing, hiking as shown in figure.

Figure 3. Monitoring and observation of the activities developed in the village Txuiri, in Bananal Island, Tocantins. (A) Preparation of hunting instrument, (B) Construction of house, (C) Purification of ornaments for ritual, (D) Collection of plants for rituals, (E) Walk and show of plants in the village (F) Fishing with hook (G) Body painting in *Javaé* boy during the rite of passage to adulthood.

Source: authors.

In methodological terms, the ethnographic method was used through the observation and interview technique, which allows a better understanding of the lifestyle and culture of a certain group [25], in which a field notebook, camera, recorder and a semi-structured questionnaire applied individually, which contained questions about the identification of plants, the purpose of consumption, how and what is used of the vegetable. As a criterion for inclusion of the participants, the minimum requirement of 14 years of age was adopted, with priority for the elderly over 50 years, called elders, because they are considered the holders of knowledge.

As not all respondents speak and understand the Portuguese language well, so during some interviews a key informant who mastered the *Iny* language was present. This strategy also allowed respondents to feel more secure and confident in answering questions. Parallel to the daily observations and the interviews, the relevant information was recorded in a field notebook.

The ethnobiological method was also used using the guided tour technique used in ethnobotany to identify the plants based on the narratives and walks to the plant's location [26]. Regarding the observation and systematization of plants, the following steps were observed: 1) Collection of specimens, with the help of the indigenous people; 2) Press the samples in the field; In the laboratory, herbalized and identified according to the Angiosperm Phylogeny Group botanical classification system and pertinent literature [27, 28], in addition to cataloging and storage at the Herbarium of the Federal University of Tocantins; criteria for the construction of tables, considering the description of the collected plants, organized in a decreasing way according to the number of times they were mentioned. The names of the plants mentioned in the interviews were also recorded in the Java language.

The results from the data survey were categorized and the results were discussed according to the literature related to the subject. The response resulting from the questionnaire/interview and reports was transcribed in their entirety and the names of the participants were preserved using their initials when necessary in compliance with the ethics and smoothness of the research.

3. Results and Discussion

Fifty-nine indigenous people from the Txuiri village were interviewed, all of whom claimed to know some type of plant usefully. In total 26 species were identified, 21 of which had indigenous names from the *Javaé* system, which is a specific form of naming. The names have meanings of history lived by their ancestors, regardless of their similarities with each other. The plants of which the indigenous names were not identified most of the time are those introduced on the island due to contact with non-indigenous people (*Tori*). The information is present in Table 1.

Among the species cited as useful in the village it was possible to organize and separate them according to the degree of importance to the community, for this purpose they were grouped into five categories of uses, being: medicinal, cultural, food, ornamental and construction.

3.1 Categories of Plant Use

It was observed that 57% of the plants cited as useful in

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Table 1. Plants cited as useful for the Txuiri Javaé indigenous on Bananal Island, Tocantins, Brazil. INDIGENOUS NAME; (Scientific name); (Categories: A=food; C=culture; Co=constructions; M=medicinal and O=ornamental.). (*) = Not identified. Nº= number of repetitions of plants.

Indigenous Name (Scientific name)	Categories	Part used	Preparation	Traditional use	Nº
BINIDÀ (*Genipa americana*)	A-C	Fruit, leaves and bark	Paintings, liquors and medicine	Paintings for rituals, anemia, asthma and child growth	5
WERY (*Bactris setosa*)	C-M	Fruit	Oil	Hair and wound healing	4
KỸWA (*Hymenaea courbaril*)	C-M	Fruit-Resin	Medicine	Ingestion of fruit, burnt resin relieves stinging sore	4
WAJAHATEBO (*Hymenaea courbaril*)	Co-M	Stemholes	Medicine	Constructions- Infections in uterus and ovary	4
WOKORONÀ (*Bixa orellana*)	C-M	Seed-brown	Tea Painting	Paintings in rituals, pregnant women nausea and toothache.	3
OWORUHYRI (*Copaifera langsdorfii*)	M	Seed-caule	Oil	Cicatrizant, anti-inflammatory.	3
* (*Astronium fraxinifolium*)	Co-M	Leaf and shells	Tea and medicine	Construction, Inflammations, Bronchitis.	3
HATOMOY (*Brosimum gaudichaudii*)	M	Stem Latex	Tea	Diarrhoea, Clean blood from impurities	3
ADIRÀ (*Curcuma longa*)	A-M	Rizome	Seasoning Tablets	Food - sore throat - fever, anti-inflammatory and cancer combat.	3
TỸTE (*Philodendron imbe*)	C- M- O	Cave leaves and root	Bath Tincture	anti-inflammatory, cicatrizing, muscular torsion, arrow and embiras constructions	3
* (*Bambusa oldhamii*)	C	Stem	Handicraft	Handicraft, benches, hunting and fishing utensils, houses	2
HABUNUWETE *(Anacardium occidentale)*	A-M	Fruit shells	Candy and juice medicine	Food, diarrhoea	2
IWEREHENI *(Momordica)*	M	Branches	Immersion	Itching, Mycosis	2
ORIXY (*Curatella americana*)	C	leafs	Handicraft	Nail and foot sandpaper, pot cleaning	2
KODWOVDI (*Protium heptaphyllum*)	C-M	Leafcut	Tea resin	Glue, waxing, stomach pain.	2
WAIABA (Psidium guajava)	A - M	Leafy-brown	Tea candy	Feeding, the leaf is used for hair loss and the sprout for tummy ache	2
MỸKA (Anacardiaceae)	A-M	Fruit Leaf	bath	Bad digestion, tummy ache, yellowing	2
ASILYNYRE (Cymbopogon citratus)	M	Leaf	Tea	Fever, flu	2
HELÃKÃREOHUTI (*Melissa officinalis*)	M	Leaves and stem	Tea	Fever, flu	1
*	M	Leaf	Tea		1
* (*Allamanda cathartica*)	O	Flowers	Plantation	Ornamentation	1
* (*Sesamum indicum*)	M	Leaf	Immersion	Stomach pains	1
* (*Dracaena trifasciata*)	M-O	Leaf	Tincture	Muscular pain	1
KOTERUTINI *	M	Root	Tea	female infertility	1
TXUKODE *	M	Root leaf	Tea	Hair left over	1
SESETI *	M	Leaf	Tea	Thrush	1
YRYHÀ *	M	Root leaf	Tea	Vomit	1
(*Jatropha mollissima*)	M	Leaf	Tea	Vermifuge	1

Source: autores

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the villages had a medicinal category. From these results it is possible to see how important the use of plants for therapeutic purposes is in traditional indigenous communities. This inferred the importance of the so-called traditional knowledge regarding the indications, contraindications and dosage. The figure of the shaman, as a connoisseur or "sole holder" mentioned by the *Javaé* people, is of fundamental importance, since he is responsible for the primary treatment of diseases in the villages, and in the second case they resort to hospitals. The medicinal category was also the most frequent with regard to the use of plants, among indigenous people from the Guarani ethnic group in previous studies [29]. Other ethnobotanical studies carried out in traditional communities have revealed and verified the extreme medicinal importance of plants used in the treatment of various diseases [30, 31].

The second category of use with 19% refers to plants with cultural purposes that are present in religious rituals, parties, body paintings, crafts with the making of necklaces, earrings, bracelets, bags and ornaments in general, and in the myths they have a strong connection with its origins, through stories of stories about plants that reveal the symbolism of the *Javaé* indigenous culture.

The plants used in food presented a smaller number of citations with 12%, which differs from studies carried out with other indigenous communities where in most cases the food category is the most frequent. An ethnobotanical study in Xokleng indigenous villages in southern Brazil found that most cultivated plants have a utilitarian aspect for food purposes [32]. A possible explanation for this result obtained with the *Javaé* indigenous people of the Txuiri village on Bananal Island is the proximity of the village to the urban area, possibly the indigenous people end up opting for the consumption of industrialized and easily obtained foods, even producing on their lands what is necessary for your survival.

The categories with the fewest mentions were the ornamental ones represented by 7% of the citations, used to beautify the environment around the homes and to decorate the places where the festivals and religious rituals are held. The category dedicated to the construction of residences and hunting and fishing instruments with 5% includes the plants used in the construction of houses and hunting and fishing tools.

It is noted that due to the cultural issues that involve local indigenous communities, it is possible to obtain diversified information. In the stages of characterization and analysis of the use of plants, it was necessary to expand the data obtained in the application of the questionnaires. In total, 28 species of plants were identified, however, a given plant had multiple uses for use that were counted individually, thus increasing the number of citations regarding the categories of use, however, the number of species remained the same.

It was noticed that a given plant has several utilitarian aspects. At the same time that they are considered food, they also have medicinal content and cultural value. As an example, *Anacardium occidentale* (Cashew), in which the fruit is used in food for the preparation of sweets and juices, and its peels (stem), has medicinal importance, serving to prepare bottles in the treatment of diarrhea, presenting in this case two categories: food and medicine. *Astrocaryum campestre* (known as Tucum) has a cultural importance for the *Javaé* Indians, who through a long and laborious process done exclusively by the women who extract the oil, a purifier of the clothes that are used by the boys in the ceremonies of the passage ritual is used that consecrate them to adulthood from the age of 14. The oil is also used as a beauty product to maintain hydration and the vivid color of women's hair. It also has a medicinal value for this indigenous community used in the treatment of wounds acting as a healer and in the relief of snake bites. Tucum presented two categories of usefulness, cultural and medicinal.

The *Americana Genipa* (known as *Jenipapo*) is strongly linked to *Javaé* culture, from the fruit is made of body paintings that symbolize various meanings. These paintings are prepared mainly during the festivals in the local villages or the surrounding villages. They present medicinal value through the use of liquors made from the fruit, which serves for the treatment of anemia. The fruit is also used in food, and according to oral reports from the indigenous people, the grandparents prevent children from using jenipapo in food, because they believe that this leads to premature aging "*if you eat the ripe jenipapo the skin becomes full of wrinkles like jenipapo when this child becomes adult*" (R.T.J, 2019).

From the bark and between the bark of this tree, a bath is prepared for newborn children, which is sacred for the *Javaé* and assists in physical development regarding height. With this information it is possible to observe that the plants have multiple uses in the *Javaé* indigenous cultural universe. It is noted that the knowledge about the use of plants and their effects on health and daily life, are related to culture, cosmology and involvement with the environment, a fact that also allows and sustains the communication / interaction between people and plants by through shamanic knowledge [33].

However, some species of plants fit only into a single category. For example, we have the Melon of São Caetano, o (*Momordica charantia*) which is useful only in the treatment of itchy and mycosis on the skin. Another ex-

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ample that can be mentioned here is the Dedal de dama or (*Allamanda catartica*) a plant that for this community is considered toxic, however, its only purpose is ornamental, they are planted around indigenous homes and their flowers make the environment more pleasant. According to the results obtained, the way of preparing the plants showed differences according to their indications for use.

3.2 Most Frequent Preparation Modes

As for the ways of preparing the plants in the village Txuiri, the use of tea stands out with 34%. The parts of the vegetable are put into the water to boil and then it is ingested orally. A similar result is observed in an ethnobotanical study conducted with indigenous people of the Kambiwá Ibimirim ethnic group from Pernambuco, northeastern Brazil, where it was found that the most frequent mode of use is characterized by tea and its consumption [34].

Another form of preparation represented by 14% of the quotations is the medicine known as *garrafada*, in which the shells or between shells are removed from the plants through cuts in the stem and after drying they are placed in containers with water or alcoholic beverages until they present a change in color, being ready for ingestion. The form of craft preparation with 12% of the quotations includes the use of wood for the construction of houses and hunting and fishing equipment such as canoes, oars, bow, arrows, spears, sticks and bordunas.

The immersion-maceration (8% of the citations) is when the parts of the vegetables are macerated and then immersed in hot water without it continuing to boil. The preparation of sweets and juices of vegetable origin with 6%. The bath represented by 4% of citations shows that the parts of the vegetables, whether leaves, peels or roots, are put in water to boil until they get a darker color and after cold used for the bath. The tincture (4% of citations) is made by the removal of parts of the leaves and roots and then immersed in a container with alcohol until a darker color is obtained. This liquid is applied externally in desired locations, serving for inflammation and muscle pain.

The preparation of the body paintings (4% of the citations) begins from the collection of the fruit of jenipapo still green a task exclusively male, then women grate the fruit that is then expressed until obtaining a liquid, and to finish the preparation is added charcoal and waits until the achievement of a darker and more consistent texture, is applied to the skin in forms of drawings that have cultural significance for the *Javaé* people. Initially the paintings on the skin are light colored and only become darker the next day, the paintings last for about a week. For the painting made from the annatto, the seeds are collected and rubbed in the hand until they present an orange color, which is then applied to the skin in the shape of strokes with indigenous meanings. Usually the painting with Annatto lasts from one to two days; its resistance is lower when compared to painting of genipap.

Figure 4. Preparation of paintings in the *Javaé* indigenous community of the Txuiri village on Bananal Island, Tocantins, Brazil. (A) Urucum seeds to be macerated (B) Mass expressed from the fruit of Jenipapo with coal dust.

Source: Authors.

The fruit of the Jatobá (*Hymenaea courbaril*) together with the resin on its stem are collected and burned until they become a powder texture that is used externally at the stingray sting or snake bite, in order to relieve pain. The oils (4% of citations) are extracted from the seeds through exclusively female techniques served as a natural repellent. The liqueurs (2% of citations) are prepared by collecting the fruit of the ripe genipap (*Genipa americana*), from which it is exclusively handled by women where they wash, peel and cut into pieces that are placed in a container to which "cachaça" is added - drink alcohol, leaving this container in a cool place for a period of approximately 20 days. After this period, the liquid in the container is filtered and the fruit pulps are discarded and add syrup with sugar and water to the liquid, and after a period of approximately 15 days the liquor is ready for consumption. Thus, the preparation, handling and use of plants, expresses the way they manifest and establish their relationships culturally, spiritually or socially with vegetables, thus ceasing to be a specific activity of the shaman, but that extends to everyone with specificities different [17, 33,35].

3.3 Parts of the Plants Used in the Txuiri Village

Regarding the use of the plant parts mentioned by the research participants, he highlights the use of leaves, with frequency equivalent to (36%) of the mentions; stem (16%); roots, branches and rhizomes (13%); fruits (11%); peels (9%); buds and flowers (7%); the use of seeds, latex and resin showed a less expressive frequency that corresponds to (4%) in the citations. These results reveal the utilitarian and cultural importance of plants among the *Javaé* indigenous people and show that different parts of the

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plants are used for different purposes, with evidence for the use of leaves. In an ethnobotanical perspective with an approach to medicinal plants, a study carried out in a traditional community of fishermen and rural workers in Bahia, northeastern Brazil, demonstrated similarities, with emphasis on the use of plant leaves [35].

Among the plants mentioned by the participants, include trees, shrubs and herbs. With regard to native plants, approximately 68% of the identified species are exclusive to the region, for example *Astronium fraxinifolium* (Aroeira da Mata), which has medicinal value in the treatment of coughs, inflammations and bronchitis, also has a utilitarian aspect in constructions by means of wood extraction. Some examples of native plants are Astrocaryum campestre (Tucum), *Genipa americana* (Jenipapo), *Bixa orellana* (Urucum) and *Protium heptaphyllum* (Amescla), *Brosimum gaudichaudii* (Inharé da mata), and *Maclura tinctoria* (Moreira).

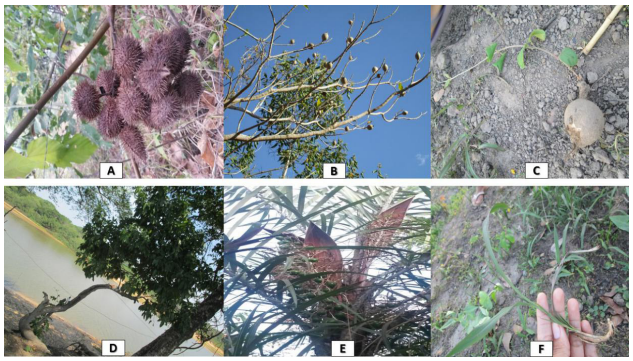

Figure 5. Native plants in Txuiri village on Bananal Island, Tocantins. A) *Bixa orellana* L. (Bixaceae) (B) *Genipa americana* L. (Rubiaceae), (C) (Malpighiaceae) Juss. (D) *Protium heptaphylum* Aubl. (Burseraceae) (E) *Astrocaryum campestre* Mart. (Arecaceae) (F) (Poacea) Barnhart.

Source: Authors

About non-native plants, about 32% of the identified species are introduced in the village, that is, they come from other places such as *Sansevieria zeylanica* (Espada-de- São-Jorge), *Allamanda cathártica* (Dedal de dama). One of the possible explanations for the insertion of exotic plants is due to the presence of non-indigenous people who also live in the surroundings and do cultural exchange. The introduction of plants from another location, mainly medicinal plants grown in the backyards of homes, is most often carried out by women who do not always have the habit of entering the forest to harvest [35,36].

3.4 Distribution of Plants Cited as Useful in Villages

Regarding the life habits of the identified plants, there is a predominance of trees (39%), followed by herbs (22%), herbs (18%), shrubs (14%) and creepers (7%). It is observed the places where it is possible to find the most frequently identified plants correspond to the backyards of the residences (36%) followed by the banks of the Javaés River (32%). The plants with characteristics of the riparian forest (11%) were mentioned a few times by the indigenous people. It is possible to notice that the most used plants are characteristics of places where there is an easier access preferably near the residences. Possibly these indigenous do not enter closed forests to discover new plants because they find what they need nearby.

Another factor worth mentioning in the *Javaé* culture is the Aruanãs (Ijasò) festival, which consists of a ritual of passage and according to oral reports by the indigenous people; they are spirits that leave the bottom of the river to visit the villages. Men participate more actively, hiding the whole body under made-up ornaments, leaving only the feet and hands exposed and dance their ritualistic songs in pairs. The plants are also useful, as their props and adornments are made from buriti and babassu palm leaves. The women participate in the party, however, submissively, they are not allowed to talk about the ritual or go to the Aruanãs' house.

Figure 6. *Aruanãs* Festival (*Ijasò*) in *Txuiri-Hinã* village

Source: authors

Due to the dry season, some of the plants mentioned could not be collected, but were mentioned as important. Macaúba (*Acrocomia aculeata*), corn (*Zea mays*), sweet potato (*Ipomoea potatoes*) and cassava (*Manihot esculenta*) are used in food and are important ingredients for the preparation of "calugi" - a typical indigenous drink. For its preparation the rice is cooked with water added to ingredients such as sweet potatoes or corn that are cooked until they have a homogeneous texture, the drink is served in small bowls built and personalized with symbols of the *Javaé* indigenous culture, the pepper (*Capsicum frutescens 'Malagueta'*) named (*Kaxiwera*) in the *Iny* language, it is used exclusively by singing men and warriors so that they have a deep and beautiful voice, it is also indicated to avoid hoarseness, increase strength making them stronger and more resistant. The nuts or nuts of the babassu palm (*Attalea speciosa*) are collected and macerated without

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adding water and then placed on the spine of children, especially newborns. Culturally, this ritual is associated with aspects related to the child's healthy growth.

It is possible to observe the traditional knowledge about the use of plants through some oral reports: "*The ancients used the monkey pepper (Kaxiwera werehe) macerated in the corner of their eyes so as not to go blind and clean their eyes*" (R.T.J, 2019).

In the *Javaé* culture, children and adolescents are prohibited from consuming cassava mass (*Manihot esculenta*), as in adulthood this will make ejaculation more delayed during their sexual relations, and according to an indigenous teacher: "*a man has to ejaculate quickly [...]. For the child to stop peeing in the hammock, they feed on the turbot "(typical food using the base of the cassava dough) and pass on the child's abdomen in the lower abdomen*" (R.T.J, 2019).

With the advent of contact with non-indigenous society promoted by public policies, the Tocantins State government implemented a bilingual school in the Txuiri village, which is called Txuiri-*Hinã*. The teachers work with the subjects of mother tongue (Iny), arts, culture and cosmology among other contents that approach subjects peculiar to their indigenous culture. In the initial series the only language taught and *Iny* favoring the *Javaé* culture, in the more advanced series, the second language taught is Portuguese, but in a more superficial way, learning only the basics. Indigenous education is one of the instruments in the process of strengthening the culture, beliefs and customs of indigenous communities.

In a dialogue and interview with a teacher, it was possible to realize the importance of the school in the process of strengthening and transmitting traditional indigenous knowledge about plants. In one of our meetings the teacher mentioned that:

"*The school receives an elder who teaches about the plants, what they are used for and how they are prepared. For fear of losing the indigenous culture, the school together with the villages began to work on this knowledge and little by little the interest of the new generation in learning about the plants is emerging*". (R.G.,2019).

Regarding the traditional ways of transmitting cultural knowledge about plants, the *Javaé* indigenous people value the empirical knowledge that is transmitted from the triad: visual through observation (looking) through orality (speech) and experimentation (doing). On the other hand, children and adolescents experience the rules imposed by the formal education of the learned in the school of the non-indigenous, based on the written record, in systems of evaluations, charges and pedagogical strategies [37]. In view of this duality in how learning takes place, traditional knowledge related to vegetables and which are linked to their beliefs and cosmology persist.

Another relevant peculiarity in the *Javaé* culture is the role of maternal and paternal grandparents, who during childhood are important and striking figures responsible for the training of grandchildren, which consists of traditional preparation and care ranging from teaching how to walk, their myths and games indigenous people, teach how to be a good hunter, fisherman and have good character. Indigenous peoples have knowledge about the environment and pass it on to their generations. This empirical knowledge from the observation of the natural world is present in different cultures and is transmitted to their descendants [38].

The elders mentioned the loss of some of the traditional knowledge with a certain concern and feeling of sadness, affirmed that many of the indigenous cultural practices are in disuse or have fallen by the wayside in the current context that, according to them, cause a "weakening of the culture". "[...] *many things only some older people who still know and use"* [...] *today, young people do not have much interest and curiosity to learn these things from the Indian*" (S.J, 2019).

Among the *Javaé* people, knowledge is transmitted within their own culture, sometimes in a more restricted way, with care being taken to preserve their doings and knowledge. According to the statements below, it is possible to perceive the concern and care of these people in preserving their knowledge:

"*There is a plant near Aruanã's house that prevents pregnancy, it is like a contraceptive. Only I can't go and get it, then I ask my father to get it*". (J.W, 2019).

"*There is a plant that is used for hair removal in the bush, and then I'll show you. There are things here that an Indian cannot tell Tori (not an Indian)*". (J.W, 2019).

In this research it was verified the importance of the traditional *Javaé* knowledge in the face of the local biological diversity. There is a need for further studies on plants with indigenous communities. Although research on the topic tends to expand, publications associated with plants and cultural diversity are still not very significant in psychological research. Indigenous interactions with the natural world and the belief that human beings are part of nature demonstrate how other cultures, individuals and nations can implement policies that address ecological crises. Based on the biological sciences, research in ethnobotany contributes to promote a responsible relationship with nature in order to avoid, or at least mitigate, social and environmental impacts [2, 8, 30].

It is also worth mentioning the contribution of ecopsychology, by enabling discussions that address emerging

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issues such as those associated with environmental problems arising from the way different cultures think and behave in the natural environment. Traditional indigenous ecological knowledge shows us a way to care for the environment, based on traditional science, cosmology, connection and reciprocity with natural goods, serving as a model of conservation, in times of current environmental and health crises [38].

4. Conclusions

The present study made it possible to survey the main useful plants in the Txuiri village, in the categories of medicine, culture, handicraft, food and construction use. It was found that tea stood out among, those of more constant daily use and the parts of the most used plants were characterized by the use of leaves. These plants are usually near the homes, thus facilitating their collection for use.

An ethnobotanical study was carried out of 28 plants in which the existence of external species such as those ornamentals introduced in the village was verified, however, the number of native plants used in the daily life of this ethnic group stands out. From the indigenous reports it was possible to identify the plants in the *Javaé* system, and the collection of plants allowed the cataloguing of 28 plant species of diversity and constant use by the community.

It was also observed that in the universe of traditional knowledge, which often seems to be mere belief and not scientific for a non-indigenous researcher, the *Javaé* people conceive as their "science", coated with beliefs, values, and meanings that are configured with the interaction of social, cultural and environmental practices as a whole, favoring the relationship man / nature / culture. In traditional indigenous communities, cultural knowledge is created, valued, preserved, and its ethnoconnections are transmitted from the experiences lived orally and visually over time to the new generations.

Finally, it was noted that these communities address several environmental issues, such as the preservation of nature, including the benefits of plants. Faced with the results it was possible to understand the resistance of the indigenous people of these communities in maintaining the culture, even in the face of the influences of non-indigenous people. The concern and effort of these people, in cultivating and maintaining their traditional knowledge passed from generation to generation, was then verified. This study contributes to the development of research in ecopsychology, based on the data obtained from the intercultural experience with the *Iny* people, the sharing of indigenous ethnobotanical knowledge, respect for culture, the unconditional lesson of the experience and ecological value of each species on the planet.

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